Comparison of Predicted and Observed
Harvest Rates and Population Sizes
of Midcontinent Mallards

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Harvest Rates

During the 1995-96 and 1996-97 hunting seasons, only 3 regulatory alternatives were available: restrictive, moderate, and liberal. Under the liberal alternative implemented in those seasons, the predicted harvest rate of adult-male midcontinent mallards was 0.118 (SE = 0.029). The observed harvest rate during the 1995-96 season was 0.120 (SE = 0.011). No estimate of the realized harvest rate is available from the 1996-97 season because of unknown changes in band-reporting rate caused by the introduction of a toll-free phone number for reporting recoveries.

The regulatory alternatives were revised in 1997 to include a very restrictive alternative, and longer season lengths and higher bag limits in the moderate and liberal alternatives. Since 1997, harvest rates of midcontinent mallards have been predicted based on the historic relationship of harvest rate to season lengths and bag limits, and on contemporary numbers of hunters (see Appendix D, *U.S. Fish and Wildlife Service, 2001, Adaptive Harvest Management: 2001 Duck Hunting Season, U.S. Dept. Interior, Washington, D.C., 47pp.*). This analysis suggests that the predicted mean harvest rate of adult male mallards under the liberal regulatory alternative is 0.131, with annual variation (CV) expected to be about 20% of the mean. Since the 1998-99 season, estimates of realized (observed) harvest rates under the liberal alternative have been available as a result of reward-banding in the Prairie Pothole Region (Table 1). Considering the expected annual variation and sampling error of harvest rates, the estimates are generally consistent with predictions. However, we recently combined the prior prediction of mean harvest rate with rates observed since the 1998-99 season (in a standard Bayesian analysis), so that we now predict the mean harvest rate under the liberal alternative (with no framework-date extensions) will be 0.121, with annual variation (CV) expected to be about 18% of the mean.

Breeding Population Size

Estimates of observed breeding-population size, pond numbers, and harvest rate are used to generate predictions of population size in the subsequent year, under each of the alternative models of mallard population dynamics. These model-specific predictions can then be averaged, using either the most recently available weights (i.e., in a prospective analysis) or the "final" weights from the end of the time frame (i.e., in a retrospective analysis) (Table 1). In either case, predicted population sizes agree well with observations, especially considering the variance of the predictions. The greatest discrepancies between predicted and observed population sizes occurred in 1999, perhaps because of an important, but unknown, environmental factor that is not included in the models.

Table 1. Comparison of observed and predicted population sizes of midcontinent mallards (traditional survey area only).

Year	Harvest rate (t-1)[a]	Breeding population size (millions)[b]				
		Observed	Predicted (t-1 weights)		Predicted (2001 weights)	
		N	N	SE(N)	N	SE(N)
1996	0.120	7.941	7.854	1.324	7.975	1.345
1997	0.118[c]	9.940	8.126	1.370	8.168	1.377
1998	0.131[c]	9.640	9.466	1.596	9.722	1.639
1999	0.112	10.806	8.093	1.364	8.413	1.418
2000	0.101	9.470	9.971	1.681	9.979	1.682
2001	0.127	7.904	8.143	1.373	8.151	1.374
2002	0.109		7.299	1.231	7.299	1.231

[a] Harvest rates are those observed (estimated) from the previous hunting season (t-1).

[b] Predicted breeding populations are based alternatively on the most recent annual model weights (i.e., from the previous year, t-1), or on the most recent cumulative weights (i.e., from 2001).

[c] Predicted harvest rate because no estimates of realized rate available.